Form TD-409 Revised 07/09/04

# INDIANA DEPARTMENT OF TRANSPORTATION

# DAILY SUMMARY OF NUCLEAR DENSITY TESTS FOR SOIL (DIRECT TRANSMISSION)

CONTRACT NO. PROJECT NO.		F	ROAD NO.	DATEWEATHER						
				_	-			<u></u>		
		Field Test Number					% MOISTURE	- ITM 506 <sup>(1)</sup>		
		Station				Α	Wt. of Pan & Wet Material (0.01 lbs.)			
Location	of Tests	Reference to Centerline				В	Wt. of Pan & Dry Material (0.01 lbs.)			
		Elevation or Lift Number				С	Wt. of Pan (0.01 lbs.)			
Compacted	Depth of L	ift				D	Wt. of Dried Material (0.01 lbs.) = B-C			
Method of (	Compaction					MC <sub>T</sub>	% Moist.( 0.1%) = [(A - B) / D] x 100			
No. of Pass	ses with Ro	ler				DEN	SITY CORRECTION FOR OVER	SIZE PARTICL	.ES <sup>(2)</sup>	(+
əɓr	1. Daily St	andard Count				No. 4 sieve)				•
Nuclear Gauge	2. Wet De	nsity From Gauge (0.1 lbs./ft <sup>3</sup> )				11. Dı	y Wt. of + No. 4 Material (0.01 lbs)			
clear	3. Dry Der	sity From Gauge (information only)				12. %	+ No. 4 Mat.( $P_c$ ) (0.1%) (line 11 / line D) $x$	100		
4. Percent Moisture From Gauge (information only)				13. %	-No. 4 Mat. (P <sub>f</sub> ) (0.1%) <b>100 - line 12</b>					
5. Percent	Moisture (0	.1%) MC <sub>T</sub> or use line 22				14. Dı	ry Den. ( $D_d$ ) (0.1 lbs/ft <sup>3</sup> ) line 2 / [1+ (MC <sub>T</sub> / 10	00)]		
6. Optimur	n Moisture	from Lab or 1-Point (1%)				15. D <sub>f</sub>	Denominator (0.01) (line 14 x line 12) / 16	2.24		
7. Dry Den	sity (0.1 lbs	s./ft <sup>3</sup> ) (line 2 / [1 + (line 5 / 100)] or use line 18				16. D <sub>f</sub>	Denominator (0.01) 100 - line 15			
8. Proctor	Maximum D	Dry Density from Lab or 1-Point (0.1 lbs./ft <sup>3</sup> )				17. D <sub>f</sub>	Numerator (0.01) line 14 x line 13			
9. Percent	Compactio	∩ (1%) line 7 / line 8 x 100				18. Ad	dj. Dry Den.(D <sub>f</sub> ) (0.1 lbs/ft <sup>3</sup> ) line 17 / line 16			
10. Percent	t Compactio	on Required 95 or 100%				MOI	STURE CORRECTION FOR OVI	ERSIZED PART	TICLES <sup>(2)</sup>	(+
		Pass/Fail					No. 4 si	eve)		
Test R	emarks	Lab Sample No.				19. M	C <sub>f</sub> Numerator (0.001) <b>0.02 x line 12</b>			
		Material Description				20. M	C <sub>f</sub> Numerator (0.001) MC <sub>T</sub> - line 19			
Remarks:						21. A	dj. Moist. (MC <sub>f</sub> ) (0.001) line 20 / line 13			
						22. A	dj. % Moisture (0.1%) line 21 x 100			

Note 1: ITM 506-Field Determination of Moisture Content of Soils used for all cohesive soils.

Note 2: In accordance with AASHTO T 224-Correction for Coarse Particles in the Soil Compaction Test. Assumes a moisture of 2% and a specific gravity of 2.60 for Pc

Qualified Te	echnician Signature:	

# INDIANA DEPARTMENT OF TRANSPORTATION

# DAILY SUMMARY OF NUCLEAR DENSITY TESTS FOR SOIL (DIRECT TRANSMISSION)

CONT	RACT NO.	PROJECT NO.		ROAD NO.		DATE	WEATHER		
		Field Test Number				% MOISTURE - I	ГМ 506 <sup>(1)</sup>		
		Station			Α	Mass of Pan & Wet Material (2 g)			
Location	of Tests	Reference to Centerline			В	Mass of Pan & Dry Material (2 g)			
		Elevation or Lift Number			С	Mass of Pan (2 g)			
Compacted	Depth of L	ift			D	Mass of Dried Material (2 g) = B-C			
Method of	Compaction				МСт	% Moist.( 0.1%) = [(A - B) / D] x 100			
No. of Pas	ses with Ro	ler			DEN	ISITY CORRECTION FOR OVERSI	ZE PARTICL	ES <sup>(2)</sup>	(+
əbr	1. Daily St	andard Count				4.75mm sie			
Nuclear Gauge	2. Wet De	nsity From Gauge (1 kg/m³)			11. D	ry Mass of + 4.75mm Material (2 g)			
olear	3. Dry Der	nsity From Gauge (information only)			12. %	$_{0}$ +4.75mm Mat.(P <sub>c</sub> ) (0.1%) (line 11 / line D) x 1	00		
4. Percent Moisture From Gauge (information only)				13. %	-4.75mm Mat. (P <sub>f</sub> ) (0.1%) <b>100 - line 12</b>				
5. Percent	Moisture (0	.1%) MC <sub>T</sub> or use line 22			14. D	ry Den. ( $D_d$ ) (1 kg/m <sup>3</sup> ) line 2 / [1+ (MC <sub>T</sub> / 100)]			
6. Optimur	n Moisture	from Lab or 1-Point (1%)			15. D	Denominator (0.001) (line 14 x line 12) / 2600			
7. Dry Der	nsity (1 kg/m	<sup>3</sup> ) (line 2 / [1 + (line 5 / 100)] or use line 18			16. D	Denominator (0.001) 100 - line 15			
8. Proctor	Maximum [	Dry Density from Lab or 1-Point (1 kg/m³)			17. D	Numerator (0.1) line 14 x line 13			
9. Percent	Compactio	n (1%) line 7 / line 8 x 100			18. A	dj. Dry Den.(D <sub>f</sub> ) (1 kg/m³) line 17 / line 16			
10. Percen	t Compaction	on Required 95 or 100%			MOI	STURE CORRECTION FOR OVER	SIZED PART	ICLES <sup>(2)</sup>	(+
		Pass/Fail				4.75mm sie	ve)		•
Test Remarks		Lab Sample No.			19. M	C <sub>f</sub> Numerator (0.001) <b>0.02 x line 12</b>			
		Material Description			20. M	C <sub>f</sub> Numerator (0.001) MC <sub>τ</sub> - line 19			
Remarks:			•		21. A	dj. Moist. (MC <sub>f</sub> ) (0.001) line 20 / line 13			
					22. A	dj. % Moisture (0.1%) line 21 x 100			

Note 1: ITM 506-Field Determination of Moisture Content of Soils used for all cohesive soils.

Note 2: In accordance with AASHTO T 224-Correction for Coarse Particles in the Soil Compaction Test. Calculations assume a moisture of 2% and a specific gravity of 2.60 for Pc

Qualified Technician Signature:	
	I hereby certify that I am qualified in the above test methods

Form TD-409 Revised 07/09/04

# INDIANA DEPARTMENT OF TRANSPORTATION

# DAILY SUMMARY OF NUCLEAR DENSITY TESTS FOR GRANULAR MATERIAL (BACKSCATTER)

CONTRACT NO. PROJECT NO.			ROAD NO.		DATE	WEATHER			
		Field Test Number				% MOISTURE - A	ASHTO T 255 <sup>(1)</sup>		
		Station			А	Wt. of Pan & Wet Material (0.01 lbs.)			
Location	of Tests	Reference to Centerline			В	Wt. of Pan & Dry Material (0.01 lbs.)			
		Elevation or Lift Number			С	Wt. of Pan (0.01 lbs.)			
Compacted	Depth of L	ift			D	Wt. of Dried Material (0.01 lbs.) = B-C			
Method of (	Compaction				МСт	% Moist.( 0.1%) = [(A - B) / D] x 100			
No. of Pass	es with Ro	ler			DEN	NSITY CORRECTION FOR OVER	SIZE PARTICL	.ES <sup>(2)</sup>	(+
əɓr	1. Daily St	andard Count				No. 4 or 3/4" sieve)			
Nuclear Gauge	2. Wet De	nsity From Gauge (0.1 lbs./ft <sup>3</sup> )			11. 🗅	Ory Wt. of Oversized Material (0.01 lbs.)			
clear	3. Dry Der	sity From Gauge (information only)			12. %	$^{\prime}_{6}$ Ovsiz. Mat.(P $_{c}$ ) (0.1%) (line 11 / line D) x	00		
N	4. Percent	Moisture From Gauge (information only)			13. %	% Fine Mat. (P <sub>f</sub> ) (0.1%) 100 - line 12			
5. Percent	Moisture (0	.1%) MC <sub>T</sub> or use line 22			14. C	Ory Den. (D <sub>d</sub> ) (0.1 lbs./ft <sup>3</sup> ) line 2/[1+ (MC $_T$ /	100)]		
6. Optimur	n Moisture	rom Lab (1%)			15. C	$O_{\rm f}$ Denominator (0.01) (line 14 x line 12) / 16	2.24		
7. Dry Den	sity (0.1 lbs	./ft <sup>3</sup> ) (line 2 / [1 + (line 5 / 100)] or use line 18			16. C	O <sub>f</sub> Denominator (0.01) <b>100</b> - <b>line 15</b>			
8. Proctor	Maximum D	Dry Density from Lab (0.1 lbs./ft <sup>3</sup> )			17. C	O <sub>f</sub> Numerator (0.01) line 14 x line 13			
9. Percent	Compactio	∩ (1%) line 7 / line 8 x 100			18. A	dj. Dry Den.( $D_f$ ) (0.1 lbs./ $ft^3$ ) line 17 / line 1	6		
10. Percent	Compaction	on Required 95 or 100%			МО	ISTURE CORRECTION FOR OV	ERSIZED PART	ICLES <sup>(2)</sup>	(+
		Pass/Fail				4.75mm or 19	.0mm sieve)		•
Test Remarks  Lab Sample No.  Material Description		Lab Sample No.			19. N	MC <sub>f</sub> Numerator (0.001) <b>0.02 x line 12</b>			
			20. N	MC <sub>f</sub> Numerator (0.001) MC <sub>τ</sub> - line 19					
Remarks:			•	•	21. /	Adj. Moist. (MC <sub>f</sub> ) (0.001) line 20 / line 13			
					22. /	Adj. % Moisture (0.1%) line 21 x 100			

Note 1: AASHTO T 255-Total Evaporable Moisture Content of Aggregates by Drying used for all aggregates and granular soils such as sand, B-Borrow sand and No. 4 & No. 30 structure backfills.

Note 2: In accordance with AASHTO T 224-Correction for Coarse Particles in the Soil Compaction Test. Assumes a moisture of 2% and a specific gravity of 2.60 for Pc

Qualified Technician Signature:	
	I hereby certify that I am qualified in the above test methods

Form TD-409 metric Revised 07/09/04

# INDIANA DEPARTMENT OF TRANSPORTATION

# DAILY SUMMARY OF NUCLEAR DENSITY TESTS FOR GRANULAR MATERIAL (BACKSCATTER)

CONT	RACT NO.	PROJECT NO.	ROAD NO.		DATE	WEATHER				
		Field Test Number			% MOISTURE -	AASHTO T 255 <sup>(1)</sup>				
		Station		Α	Mass of Pan & Wet Material (2 g)					
Location	of Tests	Reference to Centerline		В	Mass of Pan & Dry Material (2 g)					
		Elevation or Lift Number		С	Mass of Pan (2 g)					
Compacted	d Depth of L	ift		D	Mass of Dried Material (2 g) = B-C					
Method of	Compaction			МСт	% Moist.( 0.1%) = [(A - B) / D] x 100					
No. of Pas	ses with Ro	ler		DEN	SITY CORRECTION FOR OVE	RSIZE PARTICL	ES <sup>(2)</sup>	(+		
əbr	1. Daily St	andard Count				9.0mm sieve)		`		
Nuclear Gauge	2. Wet De	nsity From Gauge (1 kg/m³)		11. D	ry Mass of Oversized Material (2 g)					
clear	3. Dry Der	nsity From Gauge (information only)		12. %	Ovsiz. Mat.(P <sub>c</sub> ) (0.1%) (line 11 / line D)	x 100				
N	Percent Moisture From Gauge (information only)			13. %	Fine Mat. (P <sub>f</sub> ) (0.1%) 100 - line 12					
5. Percent	Moisture (0	.1%) MC <sub>T</sub> or use line 22		14. D	ry Den. ( $D_d$ ) (1 kg/m <sup>3</sup> ) line 2 / [1+ (MC <sub>T</sub> / 1	00)]				
6. Optimui	m Moisture	from Lab (1%)		15. D	Denominator (0.001) (line 14 x line 12)	/ 2600				
7. Dry Der	nsity (1 kg/m	<sup>3</sup> ) (line 2 / [1 + (line 5 / 100)] or use line 18		16. D	Denominator (0.001) 100 - line	e 15				
8. Proctor	Maximum [	Ory Density from Lab (1 kg/m³)		17. D	Numerator (0.1) line 14 x line 13	3				
9. Percent	Compactio	n (1%) line 7 / line 8 x 100		18. A	dj. Dry Den.(D <sub>f</sub> ) (1 kg/m³) line 17 / line 16	δ				
10. Percen	t Compaction	on Required 95 or 100%		MOI	STURE CORRECTION FOR O	VERSIZED PART	ICLES <sup>(2)</sup>	(+		
		Pass/Fail				9.0mm sieve)		,		
Test Remarks		Lab Sample No.		19. M	C <sub>f</sub> Numerator (0.001) <b>0.02 x line 1</b>	2				
		Material Description		20. M	C <sub>f</sub> Numerator (0.001) MC <sub>T</sub> -line 1	19				
Remarks:			·	21. A	dj. Moist. (MC <sub>f</sub> ) (0.001) line 20 / line 13					
				22. A	dj. % Moisture (0.1%) line 21 x 100					

Note 1: AASHTO T 255-Total Evaporable Moisture Content of Aggregates by Drying used for all aggregates and granular soils such as sand, B-Borrow sand and 4.75mm & 600 vm structure backfills.

Note 2: In accordance with AASHTO T 224-Correction for Coarse Particles in the Soil Compaction Test. Calculations assume a moisture of 2% and a specific gravity of 2.60 for Pc

Qualified Technician Signature:	
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# INDIANA DEPARTMENT OF TRANSPORATION

# DAILY SUMMARY OF MOISTURE DETERMINATION TESTS

Date:	Contract No.	Project No.	Road No.
ITM 506 <sup>1</sup> and AA	SHTO T 255 <sup>2</sup>		
	Field Test Number		
	Station		Minimum Sample Weights Ibs. (g)
Location of Tests	Reference to Centerline		
	Elevation or Lift Number		Soil (ITM 506) <sup>1</sup> 2.20 lbs. (1000 g)
Weight of Pan & Wet Material (0.01 lbs.)			#8 Stone (ITM 403) <sup>3</sup> 11.00 lbs. (5000 g)
2. Weight of Pan & Dry Material (0.01 lbs.)			#23 Sand (ITM 403) <sup>3</sup> 11.00 lbs. (5000 g)
3. Weight of Moisture	e (0.01 lbs.) line 1 - line 2		#30 Structure Backfill 1.10 lbs. (500 g)
4. Weight of Pan (0.0	01 lbs.)		#4 Structure Backfill 1.10 lbs. (500 g)
5. Weight of Dry Material (0.01 lbs.) line 2 - line 4			53 Compacted Agg. 8.80 lbs. (4000 g)
Percent Moisture (0.1%) (line 3 / line 5) x 100			73 Compacted Agg. 6.60 lbs. (3000g)
Material Description (53 stone, B-borrow, Sandy Clay, etc.)			1.5" Structure Backfill 8.80 Lbs. (4000 g)

Qualified Technician Signature:											
	I hereby	certify	that I	am	а	qualified	technician	and t	the	tests	were

conducted in accordance with proper test methods.

<sup>&</sup>lt;sup>1</sup> ITM 506 defines constant weight as the weight at which further drying at 5 minute intervals would cause less than 0.1% additional loss in weight. <sup>2</sup> AASHTO 255 defines constant weight as when further heating causes, or would cause, less that 0.1 percent additional loss in weight.

<sup>&</sup>lt;sup>3</sup> ITM 403 defines constant weight as when the sample weight decreases by less than 0.01 lbs. (5 g) over 5 minutes of heating.

# INDIANA DEPARTMENT OF TRANSPORATION

# DAILY SUMMARY OF MOISTURE DETERMINATION TESTS

Date:	Contract No.	Project No.	Road No.
ITM 506 <sup>1</sup> and AAS	SHTO T 255 <sup>2</sup>		
	Field Test Number		
	Station		Minimum Sample Masses
Location of Tests	Reference to Centerline		
	Elevation or Lift Number		Soil (ITM 506) <sup>1</sup> 1000 g
Mass of Pan & Wet Material (2 g)			#8 Stone (ITM 403) <sup>3</sup> 5000 g
2. Mass of Pan & Dry Material (2 g)			#23 Sand (ITM 403) <sup>3</sup> 5000 g
3. Mass of Moisture (	(2 g) line 1 - line 2		#30 Structure Backfill 500 g
4. Mass of Pan (2 g)			#4 Structure Backfill 500 g
5. Mass of Dry Material (2 g) line 2 - line 4			53 Compacted Agg. 4000 g
Percent Moisture (0.1%) (line 3 / line 5) x 100			73 Compacted Agg. 3000 g
Material Description (53 stone, B-borrow, Sandy Clay, etc.)			1.5" Structure Backfill 4000 g

Qualified Technician Signature:	
	I hereby certify that I am a qualified technician and the tests were
	conducted in accordance with proper test methods.

<sup>&</sup>lt;sup>1</sup> ITM 506 defines constant mass as the mass at which further drying at 5 minute intervals would cause less than 0.1% additional loss in mass. <sup>2</sup> AASHTO 255 defines constant mass as when further heating causes, or would cause, less that 0.1 percent additional loss in mass.

<sup>&</sup>lt;sup>3</sup> ITM 403 defines constant mass as when the sample mass decreases by less than 5 g over 5 minutes of heating.

Form IT-625 Revised 07/09/04

# INDIANA DEPARTMENT OF TRANSPORTATION

#### DAILY SUMMARY OF SOIL IN-PLACE DENSITY TESTS

CONTRACT NO. PROJECT NO.			ROAD NO.		DATE	WEATHER				
Field Test Number					CONE CORRECTION (C <sub>c</sub> )		$\overline{}$			
Location of Tests		Station		m <sub>1</sub>	Wt. of Apparatus Filled w/ Sand (0.01 lbs.)					
		Reference to Centerline		m <sub>2</sub>	Wt. of Apparatus & Remaining Sand		\ /			
		Elevation or Lift Number		C <sub>c</sub>	Cone Correction (0.01 lbs.) = m <sub>1</sub> -m <sub>2</sub>					
ompacte	d Depth of L	ift			BULK DENSITY OF SAND (D	3)		$\langle$		
lethod of	Compaction	1		m <sub>3</sub> Wt. of Apparatus Filled w/ Sand (0.01 lbs.)						
lo. of Pas	ses with Rol	ller		m <sub>4</sub> Wt. of Apparatus & Remaining Sand						
	1. Wet Wt.	of Mat. from Hole & Pan (0.01 lbs.)		V <sub>c</sub>	Volume of Calibration Container (0.0001ft <sup>3</sup> )					
Soil	2. Wt. Of Pan (0.01 lbs.)				$D_B$ Blk. D. Sand (0.1 lbs./ft <sup>3</sup> )= $(m_3-m_4-C_c)/V_c$					
Soli	3. Moist W	/t. of Mat. (M <sub>ws</sub> ) (0.01 lbs.) line 1- line 2			% MOISTURE - ITM 506 <sup>(1)</sup> or	AASHTO 1	255 <sup>(2)</sup>			
	4. Dry Wt. of Mat. (M <sub>DS</sub> ) (0.01 lbs.) line 3 / [1+(MC <sub>τ</sub> / 100)]				Wt. of Pan & Wet Material (0.01 lbs.)					
	5. Initial W	t. of Filled Apparatus (m <sub>5</sub> ) (0.01 lbs.)		В	Wt. of Pan & Dry Material (0.01 lbs.)					
	6. Final W	t. of Apparatus & Sand (m <sub>6</sub> ) (0.01 lbs.)		С	Wt. of Pan (0.01 lbs.)					
Sand Cone	7. Net Wt.	of Sand (0.01 lbs.) line 5 - line 6		D	Wt. of Dried Material (0.01 lbs.) = B-C					
	8. Wt. of S	cand in Hole (0.01 lbs.) line 7 - C <sub>c</sub>		$MC_T$	% Moist.( 0.1%) = [(A - B) / D] x 100					
	9. Vol. of 7	Test Hole (V <sub>H</sub> ) (0.0001 ft <sup>3</sup> ) line 8 / <b>D</b> <sub>B</sub>		DE	ENSITY CORRECTION FOR OVERS	IZE PARTIC	CLES (+ N	lo. 4) <sup>(3)</sup>		
0. Perce	nt Moisture (	(0.1%) MC <sub>T</sub> or use (line 19 x 100)		16. Dı	ry Wt. of + No. 4 Material (0.01 lbs.)					
1. Procto	or Optimum I	Moisture (1%)		17. % +No. 4 Mat. (P <sub>c</sub> ) (0.1%) (line 16 / line D) x 100						
2. Dry D	ensity of Ma	t. $(D_D)$ (0.1 lb./ft <sup>3</sup> ) (line 4 / line 9) or use line 23		18. % - No. 4 Mat. (P <sub>f</sub> ) (0.1%) 100 - line 17						
3. Procto	3. Proctor Maximum Dry Density (0.1 lbs./ft³)				19. MC <sub>f</sub> (0.001) [MC <sub>T</sub> - (0.02 x line 17)] / line 18					
4. Perce	4. Percent Compaction (1%) (line 12 / line 13) x 100			20. Dry Density (D <sub>d</sub> ) (0.1 lbs./ft <sup>3</sup> ) line 4 / line 9						
5. Perce	nt Compacti	on Required 95% or 100%		21. D <sub>f</sub> Denominator (0.01) (line 20 x line 17) / 162.24						
		Pass/Fail		22. D <sub>f</sub>	Numerator (0.01) line 20 x line 18					
Test F	Remarks	Lab Sample No.		23. Ad	dj. Dry Den.( $D_f$ ) (0.1 pcf) line 22 / (100 - line 21)					
		Material Description		Rema						

Note 1: ITM 506-Field Determination of Moisture Content of Soils used for all cohesive soils.

Note 2: AASHTO T 255-Total Evaporable Moisture Content of Aggregate by Drying used for drying sand, B-Borrow sand and No. 4 & No. 30 Structure Backfill.

Note 3: In accordance with AASHTO T 224-Correction for Coarse Particles in the Soil Compaction Test. Assumes a moisture of 2% and a specific gravity of 2.60 for Pc

Qualified Technician Signature

Form IT-625 metric Revised 07/09/04

# INDIANA DEPARTMENT OF TRANSPORTATION

#### DAILY SUMMARY OF SOIL IN-PLACE DENSITY TESTS

TRACT NO	PROJECT NO	ROAD NO.			WEATHER			
	Field Test Number			CONE CORRECTION (C <sub>c</sub> )	<u> </u>			
			m <sub>1</sub>	,				
n of Tests	Reference to Centerline		$m_2$	Mass of Apparatus & Remaining Sand (2 g)				
	Elevation or Lift Number		Cc	Cone Correction (2 g) = m <sub>1</sub> -m <sub>2</sub>				
d Depth of I	Lift			BULK DENSITY OF SAND (D <sub>B</sub> )		X		
Compaction	n		$m_3$	Mass of Apparatus Filled w/ Sand (2 g)		/\		
ses with Ro	oller		m <sub>4</sub>	Mass of Apparatus & Remaining Sand (2 g)	/			
1. Wet Ma	ass of Mat. from Hole & Pan (2 g)		V <sub>c</sub>	Vol. of Calibration Container (1cm³)				
2. Mass C	Of Pan (2 g)		D <sub>B</sub>	Blk. D. Sand (0.01 g/cm <sup>3</sup> )= <b>(m<sub>3</sub>-m<sub>4</sub>-C<sub>c</sub>) / V<sub>c</sub></b>	/			
3. Moist N	Mass of Mat. (M <sub>ws</sub> ) (2 g) line 1- line 2			% MOISTURE - ITM 506 <sup>(1)</sup> or A	ASHTO T 255 <sup>(2)</sup>			
4. Dry Ma	ass of Mat. (M <sub>DS</sub> ) (1 g) line 3 / [1+(MC <sub>T</sub> / 100)]		Α	Mass of Pan & Wet Material (2 g)				
5. Initial N	Mass of Filled Apparatus (m <sub>5</sub> ) (2 g)		В	Mass of Pan & Dry Material (2 g)				
6. Final M	Mass of Apparatus & Sand (m <sub>6</sub> ) (2 g)		С	Mass of Pan (2 g)				
7. Net Ma	ass of Sand (2 g) line 5 - line 6		D	Mass of Dried Material (2 g) = B-C				
8. Mass o	of Sand in Hole (2 g) line 7 - C <sub>c</sub>		MC <sub>T</sub>	% Moist.( 0.1%) = [(A - B) / D] x 100				
9. Vol. of	Test Hole (V <sub>H</sub> ) (1 cm <sup>3</sup> ) line 8 / D <sub>B</sub>		DENSITY CORRECTION FOR OVERSIZE PARTICLES (+ 4.75mm) <sup>(3</sup>					
nt Moisture	(0.1%) MC <sub>T</sub> or use line 19 x 100		16. Dı	y Mass of + 4.75mm Material (2 g)				
or Optimum	Moisture (1%)		17. %	+4.75mm Mat.(P <sub>c</sub> ) (0.1%) (line 16 / line D) x 100				
en. of Mat.	(D <sub>D</sub> ) (1 kg/m <sup>3</sup> ) (line 4 / line 9) x 1000 or use line 23		18. %	-4.75mm Mat. (P <sub>f</sub> ) (0.1%) 100 - line 17				
or Maximum	n Dry Density (1 kg/m³)		19. M	C <sub>f</sub> (0.001) [MC <sub>T</sub> - (0.02 x line 17)] / line 18				
14. Percent Compaction (1%) (line 12 / line 13) x 100				y Density (D <sub>d</sub> ) (1 kg/m <sup>3</sup> ) (line 4 / line 9) x 1000				
15. Percent Compaction Required 95% or 100%			21. D <sub>f</sub>	Denominator (0.001) (line 20 x line 17) / 2600				
	Pass/Fail		22. D <sub>f</sub>	Numerator (0.1) line 20 x line 18				
Remarks	Lab Sample No.		23. Ad	dj. Dry Den.(D <sub>f</sub> ) (1 kg/m <sup>3</sup> ) line 22 / (100 - line 21)				
	Material Description		Rema	rks:				
	1. Wet Mi 2. Mass 0 3. Moist M 4. Dry Ma 5. Initial M 6. Final M 7. Net Ma 8. Mass 0 9. Vol. of nt Moisture or Optimum en. of Mat. or Maximum nt Compact	Field Test Number  Station  Reference to Centerline Elevation or Lift Number  d Depth of Lift  Compaction  ses with Roller  1. Wet Mass of Mat. from Hole & Pan (2 g)  2. Mass Of Pan (2 g)  3. Moist Mass of Mat. (M <sub>ws</sub> ) (2 g) line 1- line 2  4. Dry Mass of Mat. (M <sub>DS</sub> ) (1 g) line 3 / [1+(MC <sub>T</sub> / 100)]  5. Initial Mass of Filled Apparatus (m <sub>5</sub> ) (2 g)  6. Final Mass of Apparatus & Sand (m <sub>6</sub> ) (2 g)  7. Net Mass of Sand (2 g) line 5 - line 6  8. Mass of Sand in Hole (2 g) line 7 - C <sub>c</sub> 9. Vol. of Test Hole (V <sub>H</sub> ) (1 cm <sup>3</sup> ) line 8 / D <sub>B</sub> nt Moisture (0.1%) MC <sub>T</sub> or use line 19 x 100  or Optimum Moisture (1%)  en. of Mat. (D <sub>D</sub> ) (1 kg/m <sup>3</sup> ) (line 4 / line 9) x 1000 or use line 23  or Maximum Dry Density (1 kg/m <sup>3</sup> )  nt Compaction (1%) (line 12 / line 13) x 100  nt Compaction Required 95% or 100%  Pass/Fail  Lab Sample No.	Station	Station   m_1   m_2	Station   Station   Provided   Content   Con	Station		

Note 1: ITM 506-Field Determination of Moisture Content of Soils used for all cohesive soils.

Note 2: AASHTO T 255-Total Evaporable Moisture Content of Aggregate by Drying used for drying sand, B-Borrow sand and 4.75mm & 600 

m Structure Backfill.

Note 3: In accordance with AASHTO T 224-Correction for Coarse Particles in the Soil Compaction Test. Assume a moisture of 2% and a specific gravity of 2.60 for Pc

Qualified Technician Signature

Form TD-320 d Revised 07/09/04

# INDIANA DEPARTMENT OF TRANSPORTATION

# DAILY SUMMARY OF IN-PLACE DENSITY TESTS (+3/4" Material)

CONTRACT NO. PROJECT NO.			ROAD NO.		DATE	WEATHER _		
Field Test Number					CONE CORRECTION (C <sub>c</sub> )			/
		Station		m <sub>1</sub>	Wt. of Apparatus Filled w/ Sand (0.01 lbs.)			
Location	of Tests	Reference to Centerline		$m_2$	Wt. of Apparatus & Remaining Sand			
Elevation or Lift Number		Elevation or Lift Number		C <sub>c</sub>	Cone Correction (0.01 lbs.) = m <sub>1</sub> -m <sub>2</sub>			
Compacted	ift		BULK DENSITY OF SAND (D <sub>B</sub> )					
Method of C	Compaction	ı		m <sub>3</sub>	Wt. of Apparatus Filled w/ Sand (0.01 lbs.)			
No. of Pass	es with Ro	iller		m <sub>4</sub>	Wt. of Apparatus & Remaining Sand			
q	1. Wet Wt	of Material from Hole & Pan (0.01 lbs.)		V <sub>c</sub>	Volume of Calibration Container (0.0001ft <sup>3</sup> )			
acte erial	2. Wt. Of	Pan (0.01 lbs.)		D <sub>B</sub>	Blk. D. Sand (0.1 lbs./ft <sup>3</sup> )= $(m_3-m_4-C_c) / V_c$			\
Compacted Material	3. Moist V	Vt. of Mat. (M <sub>ws</sub> ) (0.01 lbs.) line 1- line 2		% MOISTURE - AASHTO T 255				
S	4. Dry Wt.	of Mat. (M <sub>DS</sub> ) (0.01 lbs.) line 3 / [1+(MC <sub>T</sub> / 100)]		Α	Wt. of Original Sample & Pan (0.01 lbs.)			
	5. Initial V	Vt. of Filled Apparatus (m <sub>5</sub> ) (0.01 lbs.)		В	Wt. of Dried Sample & Pan (0.01 lbs.)			
	6. Final V	Vt. of Apparatus & Sand (m <sub>6</sub> ) (0.01 lbs.)		С	Wt. of Pan (0.01 lbs.)			
Sand . Cone	7. Net Wt	t. of Sand (0.01 lbs.) line 5 - line 6		D	Wt. of Dried Sample (0.01 lbs.) = <b>B-C</b>			
	8. Wt. of	Sand in Hole (0.01 lbs.) line 7 - C <sub>c</sub>		MC <sub>T</sub>	% Moisture( 0.1%) = 100(A - B) / D			
!	9. Vol. of		D	ENSITY CORRECTION FOR OVER	SIZE PARTIC	LES (+	3/4") <sup>(1)</sup>	
10. Percent	t Moisture	(0.1%) MC <sub>T</sub> or use (line 19 x 100)		16. D	ry Wt. of +3/4" Material (0.01lbs.)			
11. Proctor	Optimum	Moisture (1%)		17. %	+3/4" Mat.(P <sub>c</sub> ) (0.1%) (line 16 / line D) x 100			
12. Dry Density of Mat.(D <sub>D</sub> ) (0.1 lb./ft <sup>3</sup> ) (line 4 / line 9) or use line 23				18. %	-3/4" Mat. (P <sub>f</sub> ) (0.1%) 100-line 17			
13. Proctor Maximum Dry Density (0.1 lbs./ft³)				19. M	C <sub>f</sub> (0.001) [MC <sub>T</sub> - (0.02 x line 17)] / line 18			
14. Percent Compaction (1%) (line 12 / line 13) x 100				20. D	ry Density (D <sub>d</sub> ) (0.1 lbs./ft <sup>3</sup> ) line 4 / line 9			
15. Percent Compaction Required 95% or 100%				21. D <sub>1</sub>	Denominator (0.01) (line 20 x line 17) / 162.24			
		Pass/Fail		22. D <sub>1</sub>	Numerator (0.01) line 20 x Line 18			
Test Re	emarks	Lab Sample No.	·	23. Ad	dj. Dry Den.(D <sub>f</sub> ) (0.1 pcf) line 22 / (100 - line 21)			
		Material Description		Rema	nrks:			
		•						

Note 1: In accordance with AASHTO T 224-Correction for Coarse Particles in the Soil Compaction Test. Assumes a moisture of 2% and a specific gravity of 2.60 for Pc

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Form TD-320d metric Revised 07/09/04

# INDIANA DEPARTMENT OF TRANSPORTATION

# DAILY SUMMARY OF IN-PLACE DENSITY TESTS (+19.0mm Material)

Station   Station   Tests   Station   Statio	CONTRACT N	NO PROJECT NO	ROA	D NO	DATE	WEATHER				
Station   Mass of Apparatus Filled w/ Sand (2 g)   Mass of Apparatus & Remaining Sand (2 g)   Mass of Apparat										
Reference to Centerline   Felevation or Lift Number   Felevation Container (2 g)   Felevation Container (3 g)   Felevation Container (1 cm³)   Felevation Container		Field Test Number			CONE CORRECTION (C <sub>c</sub> )	\				
Elevation or Lift Number   Cc_   Cone Correction (2 g) = m₁-m₂		Station		m <sub>1</sub>	Mass of Apparatus Filled w/ Sand (2 g)	$\top$				
Method of Compaction   Method of Compactio	Location of Tests	Reference to Centerline		m <sub>2</sub>	Mass of Apparatus & Remaining Sand (2 g	,	\ /			
Method of Compaction   m <sub>3</sub>   Mass of Apparatus Filled w/ Sand (2 g)   m <sub>4</sub>   Mass of Apparatus & Remaining Sand (2 g)   w   Mass of Apparatus & Remaining Sand (2 g)   w   Mass of Apparatus & Remaining Sand (2 g)   w   V <sub>c</sub>   Vol. of Calibration Container (1cm³)   w   V <sub>c</sub>   V <sub>c</sub>   V <sub>c</sub>   V <sub>c</sub>		Elevation or Lift Number		C <sub>c</sub>	Cone Correction (2 g) = m <sub>1</sub> -m <sub>2</sub>					
No. of Passes with Roller    Mass of Apparatus & Remaining Sand (2 g)	mpacted Depth o	of Lift			BULK DENSITY OF SAND (D <sub>B</sub> )					
1. Wet Mass of Material from Hole & Pan (2 g)   V <sub>c</sub>   Vol. of Calibration Container (1cm³)	thod of Compacti	ition		m <sub>3</sub>	m <sub>3</sub> Mass of Apparatus Filled w/ Sand (2 g)					
2. Mass Of Pan (2 g)  3. Moist Mass of Mat. (M <sub>ws</sub> ) (2 g) line 1- line 2  4. Dry Mass of Mat. (M <sub>DS</sub> ) (1 g) line 3/[1+(MC <sub>T</sub> /100)]  5. Initial Mass of Filled Apparatus (m <sub>5</sub> ) (2 g)  6. Final Mass of Apparatus & Sand (m <sub>6</sub> ) (2 g)  7. Net Mass of Sand (2 g) line 5 - line 6  8. Mass of Sand in Hole (2 g) line 7 - C <sub>c</sub> 9. Vol. of Test Hole (V <sub>H</sub> ) (1 cm <sup>3</sup> ) line 8 / D <sub>B</sub> 10. Percent Moisture (0.1%)  C. Mass of Original Sample & Pan (2 g)  B. Mass of Original Sample & Pan (2 g)  C. Mass of Pan (2 g)  D. Mass of Dried Sample (2 g) = B-C  MC <sub>T</sub> & Moisture (0.1%) = 100(A - B) / D  DENSITY CORRECTION FOR OVERSIZE PARTICLES (+ 19.0mm)  16. Dry Mass of +19.0mm Material (2 g)	o. of Passes with F	Roller		m <sub>4</sub>	Mass of Apparatus & Remaining Sand (2 g	,	/ \			
4. Dry Mass of Mat. (M <sub>DS</sub> ) (1 g) line 37[1+(MC <sub>T</sub> 7100]]  Sand Cone  Sand Cone  Sand Cone  A Mass of Original Sample & Pan (2 g)  B Mass of Dried Sample & Pan (2 g)  C Mass of Pan (2 g)  C Mass of Pan (2 g)  D Mass of Dried Sample (2 g) = B-C  MC <sub>T</sub> Moisture (0.1%) = 100(A - B) / D  DENSITY CORRECTION FOR OVERSIZE PARTICLES (+ 19.0mm Material (2 g))  10. Percent Moisture (0.1%) MC <sub>T</sub> or use line 19 x 100  MC Mass of Original Sample & Pan (2 g)  B Mass of Dried Sample & Pan (2 g)  C Mass of Dried Sample (2 g) = B-C  MC <sub>T</sub> Moisture (0.1%) = 100(A - B) / D  DENSITY CORRECTION FOR OVERSIZE PARTICLES (+ 19.0mm Material (2 g))	J. Wet N	Mass of Material from Hole & Pan (2 g)		V <sub>c</sub>	Vol. of Calibration Container (1cm <sup>3</sup> )	$\top$				
4. Dry Mass of Mat. (M <sub>DS</sub> ) (1 g) line 37[1+(MC <sub>T</sub> 7100]]  Sand Cone  Sand Cone  Sand Cone  A Mass of Original Sample & Pan (2 g)  B Mass of Dried Sample & Pan (2 g)  C Mass of Pan (2 g)  C Mass of Pan (2 g)  D Mass of Dried Sample (2 g) = B-C  MC <sub>T</sub> Moisture (0.1%) = 100(A - B) / D  DENSITY CORRECTION FOR OVERSIZE PARTICLES (+ 19.0mm Material (2 g))  10. Percent Moisture (0.1%) MC <sub>T</sub> or use line 19 x 100  MC Mass of Original Sample & Pan (2 g)  B Mass of Dried Sample & Pan (2 g)  C Mass of Dried Sample (2 g) = B-C  MC <sub>T</sub> Moisture (0.1%) = 100(A - B) / D  DENSITY CORRECTION FOR OVERSIZE PARTICLES (+ 19.0mm Material (2 g))	2. Mass	s Of Pan (2 g)		D <sub>B</sub>	Blk. D. Sand $(0.01g/cm^3) = (m_3-m_4-C_c) / V_c$	/	\			
4. Dry Mass of Mat. (M <sub>DS</sub> ) (1 g) line 37[1+(MC <sub>T</sub> 7100]]  Sand Cone  Sand Cone  Sand Cone  A Mass of Original Sample & Pan (2 g)  B Mass of Dried Sample & Pan (2 g)  C Mass of Pan (2 g)  C Mass of Pan (2 g)  D Mass of Dried Sample (2 g) = B-C  MC <sub>T</sub> Moisture (0.1%) = 100(A - B) / D  DENSITY CORRECTION FOR OVERSIZE PARTICLES (+ 19.0mm Material (2 g))  10. Percent Moisture (0.1%) MC <sub>T</sub> or use line 19 x 100  MC Mass of Original Sample & Pan (2 g)  B Mass of Dried Sample & Pan (2 g)  C Mass of Dried Sample (2 g) = B-C  MC <sub>T</sub> Moisture (0.1%) = 100(A - B) / D  DENSITY CORRECTION FOR OVERSIZE PARTICLES (+ 19.0mm Material (2 g))	Mag 3. Moist	st Mass of Mat. (M <sub>ws</sub> ) (2 g) line 1- line 2			% MOISTURE - AASHTO T 255					
Sand Cone  6. Final Mass of Apparatus & Sand (m <sub>6</sub> ) (2 g)  7. Net Mass of Sand (2 g) line 5 - line 6  8. Mass of Sand in Hole (2 g) line 7 - C <sub>c</sub> 9. Vol. of Test Hole (V <sub>H</sub> ) (1 cm <sup>3</sup> ) line 8 / D <sub>B</sub> 10. Percent Moisture (0.1%) MC <sub>T</sub> or use line 19 x 100  C Mass of Pan (2 g)  D Mass of Dried Sample (2 g) = B-C  MC <sub>T</sub> % Moisture (0.1%) = 100(A - B) / D  DENSITY CORRECTION FOR OVERSIZE PARTICLES (+ 19.0mm)  16. Dry Mass of +19.0mm Material (2 g)	4. Dry N	Mass of Mat. (M <sub>DS</sub> ) (1 g) line 3 / [1+(MC <sub>T</sub> / 100)]		А	Mass of Original Sample & Pan (2 g)					
Sand Cone         7. Net Mass of Sand (2 g)         line 5 - line 6         D         Mass of Dried Sample (2 g) = B-C         MC <sub>T</sub> % Moisture (0.1%) = 100(A - B) / D         MC <sub>T</sub> % Moisture (0.1%) = 100(A - B) / D         D           9. Vol. of Test Hole (V <sub>H</sub> ) (1 cm³)         line 8 / D <sub>B</sub> DENSITY CORRECTION FOR OVERSIZE PARTICLES (+ 19.0mm           10. Percent Moisture (0.1%)         MC <sub>T</sub> or use line 19 x 100         16. Dry Mass of +19.0mm Material (2 g)	5. Initia	al Mass of Filled Apparatus (m <sub>5</sub> ) (2 g)		В	Mass of Dried Sample & Pan (2 g)					
Cone   7. Net Mass of Sand (2 g)   line 5 - line 6   D   Mass of Dried Sample (2 g) = B-C     8. Mass of Sand in Hole (2 g)   line 7 - C <sub>c</sub>   MC <sub>T</sub>   % Moisture (0.1%) = 100(A - B) / D     9. Vol. of Test Hole (V <sub>H</sub> ) (1 cm <sup>3</sup> )   line 8 / D <sub>B</sub>   DENSITY CORRECTION FOR OVERSIZE PARTICLES (+ 19.0mm     10. Percent Moisture (0.1%)   MC <sub>T</sub> or use line 19 x 100   16. Dry Mass of +19.0mm Material (2 g)		al Mass of Apparatus & Sand (m <sub>6</sub> ) (2 g)		С	Mass of Pan (2 g)					
8. Mass of Sand in Hole (2 g) line 7 - C <sub>c</sub> 9. Vol. of Test Hole (V <sub>H</sub> ) (1 cm <sup>3</sup> ) line 8 / D <sub>B</sub> 10. Percent Moisture (0.1%) MC <sub>T</sub> or use line 19 x 100  MC <sub>T</sub> MC <sub>T</sub> Moisture (0.1%) = 100(A - B) / D  DENSITY CORRECTION FOR OVERSIZE PARTICLES (+ 19.0mm Material (2 g)	I / NI \ 1	Mass of Sand (2 g) line 5 - line 6		D	Mass of Dried Sample (2 g) = <b>B-C</b>					
10. Percent Moisture (0.1%) MC <sub>T</sub> or use line 19 x 100 16. Dry Mass of +19.0mm Material (2 g)		8. Mass of Sand in Hole (2 g) line 7 - C <sub>c</sub>			% Moisture( 0.1%) = 100(A - B) / D					
	9. Vol.	of Test Hole (V <sub>H</sub> ) (1 cm <sup>3</sup> ) line 8 / D <sub>B</sub>		DEN	NSITY CORRECTION FOR OVERS	ZE PARTICLES (	+ 19.0mm) <sup>(1)</sup>			
11. Proctor Optimum Moisture (1%) 17. % +19.0mm Mat.(P <sub>x</sub> ) (0.1%) (line 16 / line D) x 100	10. Percent Moisture (0.1%) MC <sub>τ</sub> or use line 19 x 100			16. Dr	ry Mass of +19.0mm Material (2 g)					
11. 7 5 1 5 1 5 1 5 1 5 1 5 1 5 1 5 1 5 1 5	11. Proctor Optimum Moisture (1%)			17. %	+19.0mm Mat.(P <sub>c</sub> ) (0.1%) (line 16 / line D) x 10	00				
12. Dry Den. of Mat.(D <sub>D</sub> ) (1 kg/m <sup>3</sup> ) (line 4 / line 9) x 1000 or use line 23	12. Dry Den. of Mat.(D <sub>D</sub> ) (1 kg/m <sup>3</sup> ) (line 4 / line 9) x 1000 or use line 23				-19.0mm Mat. (P <sub>f</sub> ) (0.1%) <b>100-line 17</b>					
13. Proctor Maximum Dry Density (1 kg/m³) 19. MC <sub>f</sub> (0.001) [MC <sub>T</sub> - (0.02 x line 17)] / line 18	13. Proctor Maximum Dry Density (1 kg/m³)				C <sub>f</sub> (0.001) [MC <sub>T</sub> - (0.02 x line 17)] / line 18					
14. Percent Compaction (1%) (line 12 / line 13) x 100 20. Dry Density (D <sub>d</sub> ) (1 kg/m³) (line 4 / line 9) x 1000	14. Percent Compaction (1%) (line 12 / line 13) x 100				ry Density (D <sub>d</sub> ) (1 kg/m <sup>3</sup> ) (line 4 / line 9) x 1000					
15. Percent Compaction Required 95% or 100% 21. D <sub>f</sub> Denominator (0.001) (line 20 x line 17) / 2600	15. Percent Compaction Required 95% or 100%				Denominator (0.001) (line 20 x line 17) / 2600					
Pass/Fail 22. D <sub>f</sub> Numerator (0.1) line 20 x Line 18		Pass/Fail		22. D <sub>f</sub>	Numerator (0.1) line 20 x Line 18					
Test Remarks Lab Sample No. 23. Adj. Dry Den.(D <sub>f</sub> ) (1 kg/m <sup>3</sup> ) line 22 / (100 - line 21)	Test Remarks	Lab Sample No.		23. Ad	dj. Dry Den.( $D_f$ ) (1 kg/ $m^3$ ) line 22 / (100 - line 21	)				
Material Description Remarks:		Material Description		Rema	ırks:		·			

Note 1: In accordance with AASHTO T 224-Correction for Coarse Particles in the Soil Compaction Test. Assume a moisture of 2% and a specific gravity of 2.60 for Pc

Qualified 7	Tachnician	Signature:	
Conamileo	rechnician	Signature.	

Revised 01/01/04

# **INDIANA DEPARTMENT OF TRANSPORTATION** AASHTO T 272-MAXIMUM DENSITY OPTIMUM MOISTURE BY ONE-POINT METHOD

Contract Number			Road Number			Date			
Project Number									
		Field Test Number	r						
	Station								
Location	of Tests	Reference to Centerlin	ne						
		Elevation or Lift Numb	er						
1. Wet We	eight of Con	npacted Soil & Mold (0	.01 lbs.)	Weigh					
2. Weight	of Mold (0.	01 lbs.)		Weigh					
3. Wet Wt. of Compacted Soil (0.01 lbs.)			Line 1 - Line 2						
4. Wet Density of Compacted Soil (0.1 lbs./ft <sup>3</sup> )			Line 3 x 30						
Percent Moisture (0.1%)			ITM 506						
Maximum Dry Density (0.1 lbs./ft <sup>3</sup> )			From Curve						
Optimum Moisture Percent (0.1%)			From Curve						
Curve Nun	nber			From Curve					
_									
	1. Wt. of Pan & Wet Soil (W1) (0.01 lbs.)			Weigh					
ITM 506	2. Wt. of Pan & Dry Soil (W2) (0.01 lbs.)		Weigh						
	3. Wt. of Moisture (0.01 lbs.)		Line 1 - Line 2						
	4. Wt. of Pan (W3) (0.01 lbs.)		Weigh						
	5. Wt. of Dry Material (0.01 lbs.)		Line 2 - Line 4						
	% Moisture	e (0.1%)	(Line 3	/ Line 5) x 100					
<u> </u>									

Qualified Technician Signature:

I hereby certify that I am qualified in the above test methods

Revised 01/01/04 metric

# INDIANA DEPARTMENT OF TRANSPORTATION AASHTO T 272-MAXIMUM DENSITY OPTIMUM MOISTURE BY ONE-POINT METHOD

Date		

Qualified Technician Signature: